UNITED STATES PATENT APPLICATION

FOR

Crescendo Telephone Ringer

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Crescendo Telephone Ringer

FIELD OF THE INVENTION

[0001] The present invention relates to telephones. More particularly, the present invention relates to apparatus and methods for generating and providing a special type of audible ringing signal for a telephone.

BACKGROUND OF THE INVENTION

[0002] The hospitality industry, e.g. the hotel industry, offers a wake-up service to its guests. Typically this wake-up service is provided by ringing a bedside telephone at a predetermined time, to alarm the guest that it is time to wake up. Unfortunately, being awakened by a loud telephone ring can be quite startling and uncomfortable to the guest. Accordingly, there is a need for a better way of providing a wake-up service.

SUMMARY OF THE INVENTION

[0003] Crescendo telephone ringers and methods of providing a crescendo telephone ring signal are disclosed. The crescendo telephone ringer provides a gradual increase in audible ringing volume as a sequence of incoming electrical ring signals is detected. According to one embodiment, upon receipt of an incoming call, a first audible ring signal corresponding to a first detected electrical ring signal is set to a minimum volume. Subsequent audible ring signals corresponding to subsequent detected electrical ring signals are set to increasing volume levels. According to another aspect of the

invention, on any incoming call, once the maximum ringing level is reached, any additional rings would remain at that maximum level. The number of steps or volume increases could vary. Further, the crescendo ringing could be a user option, meaning that a user could be provided with the ability to set the telephone ringer at a constant ringing level (e.g. off, low, medium or high) or to ring in the crescendo mode.

[0004] Other aspects of the inventions are described and claimed below, and a further understanding of the nature and advantages of the inventions may be realized by reference to the remaining portions of the specification and the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagram of a telephone ringing system, according to an embodiment of the present invention; and

FIG. 2 is a diagram of a telephone ringing system, according to an alternative embodiment of the present invention.

DETAILED DESCRIPTION

[0005] Embodiments of the present invention described herein are of a telephone having a crescendo telephone ringer apparatus and methods of generating and providing crescendo telephone ringing. Those of ordinary skill in the art will realize that the following detailed description of the present invention is illustrative only and is not intended to be in any way limiting. Other embodiments of the invention will readily

suggest themselves to such skilled persons having the benefit of this disclosure. Reference will now be made in detail to implementations of the present invention as illustrated in the accompanying drawings. Unless otherwise indicated, the same reference indicators will be used throughout the drawings and the following detailed description to refer to the same or similar parts.

[0006] Referring to FIG. 1, there is shown a crescendo telephone ringing system 10, according to an embodiment of the present invention. As shown, system 10 may be integrated in a conventional telephone unit having speech network (or CODEC) 100, a handset 102, and a microphone 104 and speaker 106 for telephone units having speakerphone capabilities. System 10 is controlled by a microcontroller or microprocessor 108. (For purposes of this disclosure "microprocessor" and "microcontroller" will be used interchangeably, the understanding being that either can be used to perform the various operations described herein.) System 10 is designed so that it may be coupled to a telephone line jack (e.g. a conventional RJ11 jack) 110. Tip 112 and ring 114 lines of system 10 connect to jack 110. A ring detect circuit 116 is coupled between tip and ring lines 112 and 114. A diode bridge 118 is coupled between tip and ring lines 112 and 114 and is operable to provide polarity protection, i.e., operates to provide a diode bridge output signal (on line 120) that is of the same polarity regardless of the polarity of the input voltage polarity across the tip and ring lines 112 and 114. Ring detect circuit 116 is operable to detect a ring signal applied to tip and ring lines 112 and 114 and generate a ring detect signal. The ring detect signal is coupled to microprocessor 108, via a ring detect signal line 122. Incoming ring signals are

monitored by microprocessor 108. An audible ringing signal is software controlled and produced through an audible ring signal generator (e.g. piezo-electric buzzer, speaker, or other suitable sound-producing device) 124 coupled to a ringer control line 126.

[0007] According to an alternative embodiment, speaker 106 generates the audible ringing signal. According to this alternative embodiment, an audible ringing signal is produced by speaker 106 by control of CODEC 100, which in turn is controlled by ringer control signals provided by microprocessor 108 over ringer control line 128. Whereas only a single control line 128 is shown as coupled to CODEC 100, those of ordinary skill in the art will readily understand that more than one control line (input or output of microprocessor 108) could be interconnected between microprocessor 108 and CODEC 100.

[0008] According to an embodiment of the invention, a gradual increase in audible ringing volume is provided, as the sequence of incoming call (i.e. ringing) signals are presented across tip and ring lines 112 and 114. According to this embodiment, on an incoming call, the first ring would be at a minimum volume and subsequent rings would have increasing volume levels. Eventually a maximum volume ringing level would be reached. According to an embodiment of the invention, once this maximum volume ringing level is reached, any additional rings would remain at that maximum volume ringing level.

[0009] According to an embodiment of the invention, crescendo ringing would be a user option, meaning that a user could direct system 10 to ring at a constant ringing level (e.g. off, low, medium or high) or to ring in the above-described crescendo mode. Providing a user with this capability may be accomplished by, for example, coupling a slide switch 130 having the various ringer options (i.e. off, low, medium, high and crescendo) to inputs of microprocessor 108. Those skilled in the art will readily appreciate that, whereas a slide switch is shown, other equivalent switching mechanisms may be used. Further, according to an alternative embodiment, a "menu" item from the telephone keypad 132 may be used, eliminating the need for the slide switch. According to this embodiment, the menu item may be selectable using a "menu" key, which when pressed provides the user select options on an LCD display.

[0010] Referring now to FIG. 2, there is shown a telephone ringing system 20, according to an embodiment of the present invention. As shown, system 20 may be integrated in a telephone unit having speech network 200, a handset 202, and a microphone 204 and speaker 206 for telephone units having speakerphone capabilities. System 20 includes a crescendo ringer circuit 208 that operates directly from tip and ring lines 205 and 207, and, unlike the embodiment shown in FIG. 1, does not require use of a microprocessor. Incoming ring signals directly drive an electronic telephone tone ringer 210, which may be, for example, an LS1240A tone ringer. A slide switch 212 (or other equivalent switching mechanism) provides a user with options of setting an audible ringing volume (e.g. off, low, medium, high) of a ring signal, and an option of selecting a gradual increase in audible ringing volume (i.e. crescendo option). When set at the

crescendo setting, incoming ring tone signals from tone ringer 210 are counted by a ring counter 214. Ring counter 214 provides a control signal to a ringing volume control unit 216. For each successive ring count, ring counter 214 provides a corresponding control signal. In response to each corresponding control signal, ringing volume control unit 216 provides an associated output signal that is used to control the setting of an audible ring signal generator (e.g. a piezo-electric buzzer, speaker, or other suitable sound-producing device) 218. According to an embodiment of the invention, each successive ring count counted by ring counter 214 leads to a corresponding succession of audible ring signals, each ring in the succession having a somewhat higher volume than a preceding audible ring signal.

[0011] While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that, based upon the teachings herein, changes and modifications may be made without departing from this invention and its broader aspects. Therefore, the appended claims are intended to encompass within their scope all such changes and modifications as are within the true spirit and scope of this invention.